

Earth's Structure and Processes

8-3 The student will demonstrate an understanding of materials that determine the structure of Earth and the processes that have altered this structure. (Earth Science)

8-3.3 Infer an earthquake's epicenter from seismographic data.

Taxonomy level: 2.5-B Understand Conceptual Knowledge

Previous/future knowledge: In the 3rd grade (3-3.8), students were introduced to earthquakes as a rapid process that changes Earth's surface. In 5th grade (5-3.1), earthquakes are explained as a natural process that can have effects on both Earth's land and oceans. The measuring of earthquake waves involving the interpretation of seismic data is a new concept for this grade. Understanding of the properties of waves as part of 8-6.3 will help students to read and interpret seismographic data.

It is essential for students to know the *epicenter* is the point on Earth's surface directly above where the energy is released in an earthquake; energy that reaches the surface is greatest at this point.

- The energy spreads outward in all directions as vibrations called *seismic waves*. Seismic waves can be measured and recorded by a *seismograph*.
- The vibration record, called a *seismogram*, looks like jagged lines on paper.
- Measuring the time between the arrival of the P and S waves determines the distance between the recording seismograph and the earthquake epicenter.
- *Triangulation* identifies the epicenter of an earthquake. The location of an earthquake's epicenter is found by plotting circles on a map from the records of three seismograph stations and finding the point where the three circles intersect.

It is not essential for students to determine the magnitude of an earthquake based on seismographic data.

Assessment Guidelines:

The objective of this indicator is to *infer* an earthquake's epicenter; therefore, the primary focus of assessment should be to draw a logical conclusion as to an earthquake's epicenter given data from seismographs. However, appropriate assessments should also require students to *recognize* that a seismogram is used to determine the distance from the earthquake epicenter to the seismograph; or *interpret* a diagram with seismographic data plotted; or *recognize* how seismic waves move from the focus of the earthquake.